

R.M.U. USE ONLY
PROBLEM STATEMENT NO:
DATE OF RECEIPT:



## STAGE I RESEARCH PROBLEM STATEMENT

### I. PROBLEM TITLE (required): Compost Application for Optimized Vegetation Response

- II. **PROBLEM STATEMENT (required):** Revegetation of roadside disturbances has proven difficult when inhospitable growth media has been encountered. Recognizing that compost application may dramatically improve vegetation development, MDT contracted with MSU Reclamation Research Unit to perform a research investigation evaluating compost application and incorporation on steep cut slopes. This research project was initiated during 2003. Several research plots were constructed near Happys Inn on U.S. 2 and near Miles City on U.S. 12. Summer 2004 was the first growing season for all the research plots. Vegetation response spanned a wide range from robust vegetation development on the compost treated plots at Happys Inn to incipient vegetation growth at the Miles City research site. The problems observed with compost application technologies are two-fold. First, the rate of application has not been optimized to minimize cost. Two application rates were applied during construction of research plots; a 1 inch and 2 inch layer. In the high moisture regime of northwest Montana, plants flourished in both treatments. It is probable that a lesser application rate can achieve acceptable vegetation results, and make the use of compost more attractive by virtue of reduced cost. A need exists to optimize application rates to reduce cost. Secondly, compost applied as a blanket at the Miles City research site was desiccated during the summer months reflecting drought conditions observed in eastern Montana. Concurrent wind removal of the compost prior to plant establishment diminished the potential treatment benefit. Substantial areas on the treated plots were negatively impacted by wind transport of applied compost. A need exists to develop techniques to stabilize compost and prevent wind effects.

In summary, development of compost amendment techniques show great promise for aiding in revegetation of difficult parent material along Montana transportation corridors. Preliminary results from existing test plots are very promising. Prior to adoption of compost-based revegetation prescriptions for large scale construction projects, optimization of the techniques employed and rates of application is required to address limitations observed. The compost application rate needs to be adjusted downward on sites with abundant rainfall to identify an optimal rate and techniques need to be developed to prevent compost blowing in wind-prone areas.

### III. RESEARCH PROPOSED (required):

New research plots are proposed to optimize the compost application technology for Montana roadsides. The Four Corners-Madison River road corridor on Highway 84 is tentatively selected as a research site reflecting proximity to a compost supplier, proximity to Montana State University and sparsely vegetated roadcuts observed. Experimental plots will be constructed to evaluate compost application rates between 0 and 1 inch depths. The preliminary compost blanket thicknesses are 0, 0.25, 0.5, 0.75 and 1.0 inches. Vegetation response and erosional condition will be monitored. Similarly, experimental plots will be constructed evaluating several methods of stabilizing compost to prevent wind removal prior to vegetation establishment. The preliminary stabilization treatments include application of plastic netting, and use of liquid tacifiers. Compost retention and plant performance will be monitored for 3 years following implementation with emphasis placed on the critical first growing season.

### IV. IT COMPONENT (required): Identify if the project includes an IT component (purchasing of IT hardware, development of databases, acquisition of existing applications, etc) or not. If so, describe IT component in as much detail as possible.

No IT component is required to complete the research described. Desktop PCs will be used for data management and reporting. No PCs will be purchased by the proposed research investigation.

**URGENCY AND EXPECTED BENEFITS (required):**

Effective revegetation prescriptions are required on Montana roadways for several reasons. Ineffective vegetation establishment leads to increased maintenance costs caused by accelerated erosion and sedimentation of engineered features leading to water conveyance problems. Water problems include roadbase saturation and water flow onto road surfaces. Motorist safety is compromised when debris such as large rock falls onto roadways or when road surfaces become wet or ice covered when ditches become clogged with sediment. Stormwater runoff is also dramatically increased when slopes are poorly vegetated. Stormwater runoff into waters of the State are also prohibited under the Montana Water Quality Act and subject to a potential \$25,000 per day violation.

It is expected that the proposed research will resolve the two outstanding technical issues related to adoption of compost application technologies along Montana roadways for enhanced vegetation development and stormwater control.

**V. IMPLEMENTATION PLAN (required):**

Since substantial activity occurred during the preceding project related to literature review and equipment evaluation, this project is more narrowly scoped to include site selection, material testing, plot construction and effectiveness monitoring. Site selection will be conducted with close interaction with MDT personnel. It is suggested that the Madison River-Four Corners road corridor might be an appropriate selection to minimize travel time and maximize monitoring. Materials testing will include benchtop evaluation of several formulations of compost/tackifier to assess susceptibility to wind transport. Plot construction will occur after site selection and material testing. Plot construction will occur either in the spring or fall when suitable conditions exist for seeding. Monitoring will occur for 3 years following implementation.

**VI. SUBMITTED BY: (required)**

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**VIII. SPONSOR(S): (Internal to MDT, Division Administrator or higher)**

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Note: Submitter may attach continuation sheets if necessary.